

ATTACHMENT 2. ENVIRONMENTAL CONSEQUENCES— MITIGATION STRATEGIES CHECKLIST

This checklist has been designed to be used by those preparing environmental documents tiering from the CALFED PEIS/EIR. The checklist can be used by the NEPA and CEQA lead agencies as a template for preparing an EA/initial study). It will also be used by CALFED to ensure that all environmental documents tiering from the PEIS/EIR appropriately address the issues and mitigation measures identified in the PEIS/EIR.

The checklist includes a list of the impacts and programmatic mitigation strategies identified in the PEIS/EIR. It also includes columns, to be filled out by the lead agencies, indicating whether each listed impact applies to the proposed project, whether it is discussed in the EA/initial study, and what mitigation measures are proposed. It also includes a column for the preparer to enter notes clarifying or elaborating on the answers provided.

The list of mitigation measures is derived from the impact summary tables in the PEIS/EIR. Changes to the impact statements, significance findings, and mitigation measures made during preparation of the CEQA findings are noted in the text.

WATER SUPPLY AND WATER MANAGEMENT

No potentially significant unavoidable impacts related to water supply and water management are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Potential temporary local water supply interruptions due to turbidity of water during construction of Program facilities and habitat restoration activities.	1				

Mitigation Strategies

1. Using best construction and drainage management practices to avoid transport of soils and sediments to waterways.

WATER QUALITY

Bold indicates a potentially significant unavoidable adverse impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Releases of inorganic and organic suspended solids into the water column and turbidity resulting from increased erosion during construction, dredging, or drainage of flooded lands	7,8,9,19				
Releases of toxic substances, such as pesticides, selenium, and heavy metal residues, into the water column during construction and dredging and other Program actions.	7,8,9,14,15, 19				
Net increases in salinity, if evaporation increases from converting irrigated cropland to wetlands.	2,3,13				
Increased EC (a measure of salinity) of water in the Delta	2,3,12				
Increases of TOC in river water caused by the increased contact between flowing or ponded water and vegetation or peat soils that would result from conversion of agricultural lands to wetlands and from actions in other Program elements.	4,5,10,11,12				
Increased water temperatures and resultant decreased dissolved oxygen concentrations due to the increased residence time of water in the Delta.	2,3,13, 17 listed in findings				
Decreases in in-stream water quality if water use efficiency measures or water transfers reduce diluting flows.	1,2,3				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Increases in concentrations of constituents of concern if water transfers reduce in-stream flows and deplete river assimilative capacities.	1,2,3,6				
Increases in methylation of mercury in constructed shallow-water habitat.	16				
Degradation of surface water by the transfer of poorer quality groundwater.	2,3				
Changes in natural flow regimes in areas where new surface storage is built.	17				
Surface storage inundation of toxic material.	18				

Mitigation Strategies

1. Improving treatment levels provided at municipal wastewater treatment plants to upgrade the quality of the constituents of concern discharged to receiving waters in order to compensate for the reduction in dilution caused by improved water use efficiency or water transfers. Salt concentrations in discharges could be reduced by improved salt management of wastewater inputs to treatment plants.
2. Releasing additional water from enlarged or additional off-stream storage, or from additional groundwater storage.
3. Releasing additional water from storage in existing reservoirs or groundwater basins.
4. Treating water at the source (such as Delta drains), upgrading water treatment processes at drinking water treatment plants, and/or providing treatment at the point of use (consumer's tap).
5. Using innovative, cost-effective disinfection processes (for example, UV irradiation and ozonation- in combination with other agents) that from fewer or less harmful DBPs.
6. Using existing river channels for water transfers and timing the transfers to avoid adverse water quality impacts.
7. Using best construction and drainage management practices to avoid transport of soils and sediments into waterways.

8. Using cofferdams to construct levees and channel modifications in isolation from existing waterways.
9. Using sediment curtains to contain turbidity plumes during dredging.
10. Separating water supply intakes from discharges of agricultural and urban runoff.
11. Applying agricultural and urban BMPs, and treating drainage from lands with concentrations of potentially harmful constituents to reduce contaminants. Treating drainage from agricultural lands underlain by peat soils to remove TOC.
12. Relocating diversion intakes to locations with better source water quality.
13. Restoring additional riparian vegetation to increase shading of channels.
14. Conducting core sampling and analysis of proposed dredge areas and implementing engineering solutions to avoid or prevent environmental exposure of toxic substances after dredging.
15. Capping exposed toxic sediments with clean clay/silt and protective gravel.
16. Testing for mercury in soils and locating constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.
17. Operating surface storage release times and magnitude to mimic natural regimes.
18. Avoiding inundation or designing solutions to inundation of toxic materials, such as covering with an engineered cap.
19. Scheduling ground-disturbing construction during the dry season.

GROUNDWATER RESOURCES

No potentially significant unavoidable impacts on groundwater are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Changes in groundwater levels	1,2,3,4,5,6,12,15,19,20				
Increased demand for groundwater supplies	1,2,3,5,7,9,15				
Increased groundwater overdraft	4,8,10,11,15,16,19				
Increased land subsidence	4,8,10,11,12,13,14,15,16,19,20				
Increased degradation of groundwater quality from contaminant movement, salt-water intrusion, or natural poor-quality water drawn into the aquifer	2,8,10,11,12 (in findings), 14,15,16,17,18, 19,20				
Impacts from groundwater recharge and storage system operations	4,7,8,10,11,12,15,16,18,19,20 (in findings)				

Mitigation Strategies

1. Creating additional groundwater or surface water storage facilities to meet demand without resorting to overdraft.
2. Importing water from other basins.
3. Purchasing water rights from willing sellers (including transferring water rights between sectors – for example, from agriculture to municipal uses).
4. Regulating groundwater withdrawals to avoid overdraft and third-party impacts.
5. Implementing water conservation measures to reduce demand.
6. Integrating Ecosystem Restoration Program floodplain restoration efforts with setback levees.
7. Increasing water supplies from recycling.
8. Increasing regulations regarding new and existing domestic wells and septic systems.

9. Developing alternative water supplies.
10. Monitoring and testing groundwater wells and aquifers.
11. Limiting new septic tank systems in vulnerable areas.
12. Allowing water levels to increase periodically
13. Importing new soil (including dredged spoil) to raise land surface.
14. Reducing or discontinuing groundwater pumping.
15. Recharging vulnerable aquifers through injection wells (confined aquifers) or percolation ponds (unconfined aquifers).
16. Distributing groundwater pumping over a wide region rather than to a concentrated area to minimize drawdown of the aquifer.
17. Treating extracted groundwater at the well head.
18. Diluting poor-quality groundwater with higher quality water.
19. Developing groundwater basin management plans, including defining objectives, project boundaries, responsibilities, operations and maintenance specifications and procedures, and conditions under which corrective action must be taken.
20. Temporarily removing the recharge system from service.

GEOLOGY AND SOILS

No potentially significant unavoidable impacts on geology and soils are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Increased conversion of agricultural land soils for levee system construction and increased potential for erosion on outboard slope of levees.	3,4,5,6,8,9, 14,15,16				
Potential for increases in local subsidence from potential increased reliance on groundwater use.	1,2				
Potential for increases in wind and soil erosion and in soil salinity due to fallowed agricultural lands.	4,9,10,11				
Increased construction-related short-term soil erosion, and increased sediment deposition or soil compaction.	4,5,6,8,14, 16				
Potential changes to downstream geomorphology from enlarging existing storage facilities.	6,7,8,12, 17, 18				
Ground disturbance, inundation, seepage, and shoreline wind- and wave-generated erosion from new storage facilities.	4,5,6,14, 16,19,20, 21,22 (in findings)				

Mitigation Strategies

1. Monitoring groundwater levels and subsidence in areas of increased reliance on groundwater resources and regulating withdrawal rates at levels below those that cause subsidence.
2. Minimizing or avoiding direct groundwater transfers or groundwater substitution transfers from regions; (1) experiencing long-term overdraft, (2) where subsidence historically has occurred, or (3) where local extensometers indicate that subsidence rates are increasing.
3. Protecting flooded Delta island inboard levee slopes against wind and wave erosion with vegetation, soil matting, or rock.

4. Protecting exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.
5. Implementing erosion control measures and bank stabilization projects where needed.
6. Increasing sediment deposition and providing substrate for new habitat by planting terrestrial and aquatic vegetation.
7. Measuring channel morphology over time to monitor changes and implementing erosion control measures where needed.
8. Re-using dredged materials to reduce or replace soil loss.
9. Leaving crop stubble from previous growing season in place while fallowing and employing cultivation methods that will cause the least amount of disturbance in order to minimize erosion of surface soils.
10. Limiting the salinity of replacement water, relative to local conditions, in water transfers.
11. Ensuring that the volume of irrigation water used is sufficient to flush accumulated salts from the root zone.
12. Operating new storage facilities to minimize sediment trapping and transport in rivers and tributaries.
13. Preparing and implementing best construction management plans.
14. Preparing and implementing a water quality and soils monitoring program.
15. Preparing and implementing construction mitigation plans.
16. Preparing and implementing contingency plans for wetland and marshland restoration.
17. Modifying storage facility operations to maintain the frequency, magnitude, and duration of flows necessary to maintain and restore downstream riparian habitat.
18. Controlling boat traffic in order to reduce boat wake levels that will not cause levee or bank erosion.
19. *Monitoring water-level conditions on islands adjacent to in-Delta storage.
20. *Installing interception wells around in-Delta storage facility and operating to remove excess seepage.
21. *Lining conveyance for in-Delta storage to prevent seepage.

*These mitigation strategies were listed in the EIS, but not assigned to an impact. To be determined later whether or not they could be used to mitigate seepage impacts (impact #6). Used in findings for impact 6.

NOISE

No potentially significant unavoidable noise impacts are associated with the Preferred program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Increased noise from heavy equipment operation during construction.	1,4,5,6,7,8,9,10,11				
Increased noise from increases in traffic along major access and haul routes, and increased vehicle traffic associated with the construction labor force.	2,3,4,8,11				
Increased noise from diversion and storage facility operations, including spillways, pumps, generating plants and switchyards.	1,4,5,6,9,10				
Increased noise from automobile or boat traffic associated with recreational use at enlarged reservoirs.	10				
Increased traffic noise from permanently relocated roadways.	10,12				

Mitigation Strategies

1. Using electrically powered equipment instead of internal combustion equipment where feasible.
2. Locating staging and stockpile areas, and supply and construction vehicle routes as far away from sensitive receptors as possible.
3. Establishing and enforcing construction site and haul road speed limits.
4. Restricting the use of bells, whistles, alarms, and horns to safety warning purposes.
5. Designing equipment to conform with local noise standards.

6. Locating equipment as far from sensitive receptors as possible.
7. Equipping all construction vehicles and equipment with appropriate mufflers and air inlet silencers.
8. Restricting hours of construction to periods permitted by local ordinances.
9. Locating noisy equipment within suitable sound-absorbing enclosures.
10. Erecting sound wall barriers or noise attenuation berms between noise generation sources and sensitive receptors.
11. Scheduling construction activities to avoid breeding seasons of sensitive species and peak recreation use.
12. Locating redirected roadways as far from sensitive receptors as possible.

TRANSPORTATION

Bold indicates a potentially significant unavoidable adverse impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Relocating or permanently closing roads.	3				
Increasing local traffic flows as the public accesses recreational resources at new storage facilities.					
Changing traffic flows as roads are temporarily rerouted around construction sites	1,3				
Detouring traffic as new roadways and railroad bridges are constructed around storage facility construction.	1,2				
Adding construction vehicles to existing traffic levels, especially on narrow, two-lane local roads with winding routes.	4				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Closing two-lane roads to one lane in order to facilitate roadway improvements or relocations in association with the Watershed Program.	1,4				
Impeding or blocking patrol or rescue boats in Delta sloughs where fish barriers and flow control structures are installed.	5				

Mitigation Strategies

1. Providing convenient and parallel detours to routes closed during construction.
2. Allowing trains to use existing tracks while bridges are being built.
3. Encouraging use of public transportation and carpooling for construction workers.
4. Clearly marking roadway intersections with warnings where visibility is poor in the project vicinity.
5. Providing boat portage or a stationary jib crane, relocating boat launch facilities, or relocating emergency access roads.
6. Requiring contractors to use appropriate state and federal safety protocols.*

*This mitigation strategy was listed in the EIS, but not assigned to an impact. Impact assigned in findings: Creating safety conflicts by creating large, slow-moving dredging equipment in Delta waterways.

AIR QUALITY

No potentially significant unavoidable impacts on air quality are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Direct, short-term air pollutant emissions during construction activities.	1,2,3,6,7,8,9,10,11,12,13				
Increased fugitive emissions of wind-blown dust.	13,6,7,8,11,12,14 (in findings)				
Increased fugitive emissions of wind-blown dust from unvegetated, fallowed land; shifts to crops associated with drier topsoil; or changes in cultivation practices. **This impact not discussed in findings	13,14				
Increased emissions associated with prescribed burning programs.	5				
Increased emissions from increases in equipment use and cultivation, agricultural chemical use, and crop shifting and burning.	2,4, 5 (in findings)				
Increased emissions if land use changes lead to higher residential, commercial, or recreational uses.	3,15,16				
Increased use of fossil fuels or other energy resources associated with pressurized irrigation systems.	2,3,10				

Mitigation Strategies

1. Setting traffic limits on construction vehicles.
2. Maintaining properly tuned equipment.
3. Limiting the hours of operation or amount of equipment.
4. Limiting the use of agricultural chemicals.
5. Coordinating prescribed burning programs with relevant air quality management agencies to ensure that the programs are accounted for in state and federal air quality management plans.
6. Regular, periodic watering of construction sites to control levels of dust in the air.
7. Using soil stabilizers and dust suppressants on unpaved service roadways.
8. Daily contained sweeping of paved surfaces.
9. Limiting vehicle idling time.
10. Using alternatively fueled equipment.
11. Requiring selection of borrow sites that are closest to fill locations.
12. Implementing construction practices that reduce generation of particulate matter.
13. Hydroseeding and mulching exposed areas.
14. Using cultivating practices that minimize soil disturbance.
15. Following air basin management plans to avoid or minimize vehicle-related emissions.
16. Restricting the kinds of recreational vehicles or the times of operation for certain off-road vehicles on fallowed agricultural land to limit the amount of fugitive dust.

AQUATIC AND FISHERY RESOURCES

Bold indicates a potentially significant unavoidable adverse impact.

*Potentially significant impacts of the Preferred Program Alternative on fish and other aquatic species populations would be avoided or reduced to a less-than-significant level through application of mitigation strategies. The asterisk identifies those potentially significant impacts that reflect potential harm to individual organisms of special-status species.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Potential increased non-native species abundance and distribution to levels detrimental to native species from reestablishment of aquatic areas.	4, 9				
Potential blocked access to habitat and potentially altered water quality and flow conditions from placement of barriers in the south Delta.*	3,5				
Potential altered natural ecosystem structure, removal of benthic communities, and creation of conditions that may damage habitat for desired species from dredging activities.	1,2,3				
Release of toxic substances into surface waters.	10,11,12				
Potential short-term disturbance of existing biological communities and species habitat, mobilized sediments, and input contaminants from construction activities.	1,2, 10 (in findings)				
Potential reduced streamflow and Delta outflow, changed seasonal flow and water temperature variability from water supply management, and changes in salinity associated with several Program elements—potentially	5,9				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
resulting in reduced habitat abundance, impaired species movement, and increased loss of fish to diversions.*					
Potential increased entrainment loss of chinook salmon and other species from diversions to new off-stream storage.	5,6,7,9				
Potential reduced frequency and magnitude of net natural flow conditions in the south and central Delta (potentially reducing system productivity, impairing species movement, and increasing losses to diversions) from DCC operations and south Delta barriers.*	5,9				
Potential for reduced net flow conditions in the Sacramento River downstream from the diversion facility on the Sacramento River, potentially reducing fresh-water area and affecting species movement and survival.*	5,8,9				
Potential increased fish mortality through abrasion, increased predation, and other factors from the new fish screen facility for the diversion facility on the Sacramento River.*	5,7,8,9				
Potential delayed migration and reduced spawning success for adult fish moving from the Mokelumne River channels into the Sacramento River from fish screens and the diversion facility on the Sacramento River.*	5				

Mitigation Strategies

1. Implementing BMPs, including a stormwater pollution prevention plan, toxic materials control and spill response plan, and vegetation protection plan.
2. Limiting construction activities to windows of minimal species vulnerability.
3. Creating additional habitat for desired species, including increasing aquatic area and structural diversity through construction of setback levees and channel islands.
4. Controlling undesirable non-native species.
5. Operating new and existing diversions to avoid and minimize effects on fish (avoiding facility operations during periods of high species vulnerability). The operational changes could reduce water availability for other beneficial uses identified in Section 5.1, “Water Supply and Water Management.”
6. Locating the diversion point to avoid primary distribution of desired species.
7. Controlling predators in the diversion facility (screen bays) and modifying diversion facility structure and operations to minimize predator habitat.
8. Constructing a barrier to fish movement on Georgiana Slough. Adverse impacts of a flow barrier, however, would need to be considered.
9. Coordinating and maximizing water supply system operations flexibility consistent with seasonal flow and water temperature needs of desired species.
10. Conducting core sampling and analysis of proposed dredge areas and engineering solutions to avoid or prevent environmental exposure of toxic substances after dredging.
11. Capping exposed toxic sediments with clean clay/silt and protective gravel.
12. Locating constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.

VEGETATION AND WILDLIFE RESOURCES

Bold indicates a potentially significant unavoidable adverse impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Temporary or permanent loss or degradation of wetland and riparian communities.	1,2,3,4,5,13, 14 (in findings), 15				
Substantial temporary or permanent loss or disturbance of wintering waterfowl habitat.	6, 5 (in findings)				
Substantial decrease in important upland wildlife habitat and use areas.	1,4,7, 9,14 (in findings)				
Temporary or permanent fragmentation of riparian habitats and/or wildlife movement corridors.	1,3,4, 5,8, 9 (in findings)				
Temporary or permanent loss of habitat or direct impacts on special-status species.	1,2,3,4,5,9, 10,11,14, 15 (in findings)				
Loss or degradation of portions of rare natural communities and significant natural areas.	1,2,3,4, 10 (in findings)				
Temporary disturbance or mortality of special-status species due to construction and habitat management activities.	1,4,12 (in findings),14				
Permanent loss of incidental wetland and riparian habitats that depend on agricultural inefficiencies.	3				
Reduction in quantity or quality of forage for species of concern.	2,5,6 (in findings),11				

Mitigation Strategies

1. Avoiding direct or indirect disturbance to wetland and riparian communities, special-status species habitat, rare natural communities, significant natural areas, or other sensitive habitat.
2. Designing Program features to permit on-site or nearby restoration of wetlands, riparian habitat, special-status species habitat, rare natural communities, and significant natural areas that have been removed by permanent facilities.
3. Restoring or enhancing in-kind wetland and riparian habitat or rare natural communities and significant natural areas at off-site locations before, or at the time that, project impacts are incurred.
4. Restoring wetland and riparian communities, special-status species habitat, and wildlife use areas temporarily disturbed by on-site construction activities immediately following construction.
5. Phasing the implementation of Ecosystem Restoration Program habitat restoration to offset temporary habitat losses and to restore habitat (including special-status species habitat) before, or at the same time that, project impacts associated with the Ecosystem Restoration Program are incurred.
6. Restoring or enhancing waterfowl foraging habitat near existing use areas.
7. Enhancing or restoring upland habitat areas (including modification of existing land management practices) within affected watersheds or in other watersheds.
8. Phasing the implementation of modifications to levees that would be necessary to meet PL 84-99 standards in order to minimize the effects of fragmentation of riparian habitats and associated wildlife.
9. Avoiding construction or maintenance activities within or near habitat areas occupied by special-status wildlife species or in important wildlife use areas when species may be sensitive to disturbance.
10. Establishing additional populations of special-status species in protected suitable habitat elsewhere within their historical range for species for which relocation or artificial propagation is feasible.
11. Altering agricultural practices to improve habitat conditions for affected special-status species that use agricultural lands. This could include planting and managing crops to increase the availability or quantity of forage for affected species.
12. Implementing BMPs.*

13. Maintaining sufficient outflow downstream of constructed off-stream reservoirs to maintain existing downstream wetland riparian communities.
14. Managing recreation-related activities on lands managed under the Program to reduce or avoid impacts on sensitive habitat, important wildlife use areas, and special-status species.
15. Avoiding creation of wetlands in areas with high concentrations of mercury in sediments.

*This mitigation strategy was listed in the EIS, but not assigned to an impact. ** In the Statement of Findings, it is assigned to impact 7.

AGRICULTURAL LAND AND WATER USE

Bold indicates a potentially significant unavoidable adverse impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Conversion of prime, statewide important, and unique farmlands to project uses.	1,2,5,6,7,8,9, 10,11,12,13, 14,15,16,17, 18,20,21,24, 25 (in findings), 26,27				
Conflicts with local government plans and policies.	3,4,25				
Conflicts with adjacent land uses.	19,22,23				

Mitigation Strategies

1. Siting and aligning Program features to avoid or minimize impacts on agriculture.
2. Examining structural and nonstructural alternatives to achieving project goals in order to avoid impacts on agricultural land.
3. Implementing features that are consistent with local and regional land use plans.
4. Involving all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits.

5. Retaining water allocations from retired drainage-impaired lands within the existing water districts.
6. Supporting the testing and application of alternative crops to idled farmland (for example, agroforestry or energy crops).
7. Providing water supply reliability benefits to agricultural water users.
8. Supporting the California Farmland Conservancy Program in acquiring easements on agricultural land in order to prevent its conversion to urbanized uses and increase farm viability. Focusing on lands in proximity to where any conversion impact takes place.
9. Restoring existing degraded habitat as a priority before converting agricultural land.
10. Focusing habitat restoration efforts on developing new habitat on public lands before converting agricultural land.
11. If public lands are not available for restoration efforts, focusing restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).
12. Using farmer-initiated and developed restoration and conservation projects as a means of reaching Program goals.
13. Where small parcels of land need to be acquired for waterside habitat, seeking out points of land on islands where the ratio of levee miles to acres farmed is high.
14. Obtaining easements on existing agricultural land for minor changes in agricultural practices (such as flooding rice fields after harvest) that would increase the value of the agricultural crop(s) to wildlife.
15. Including provisions in floodplain restoration efforts for compatible agricultural practices.
16. Purchasing water for habitat purposes so that the same locality is not affected over the long term.
17. Using a planned or phased habitat development approach in concert with adaptive management.
18. Minimizing the amount of water supply required to sustain habitat restoration acreage.
19. Developing buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.

20. In implementing levee reconstruction measures, working with landowners to establish levee reconstruction methods that avoid or minimize the use of agricultural land.
21. Working with landowners to establish levee subsidence BMPs that avoid impacts on land use practices. Through adaptive management, further modify BMPs to reduce impacts on agricultural land.
22. Implementing erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetating areas with native riparian plants and wet meadow grasses.
23. Protecting exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.
24. Using rotational fallowing to reduce selenium drainage.
25. Advising the Director of Conservation and the local governing body responsible for the administration of the preserve of a proposal, when it appears that land within an agricultural preserve may be acquired from a willing seller by a state CALFED agency for a public improvement as used in Government Code Section 51920.
26. Limiting the number of acres that can be fallowed (in order to produce transferrable water) in a given area (district or county) or the amount of water that can be transferred from a given area.
27. Supporting assistance programs to aid local entities in developing and implementing groundwater management programs in water transfer source areas.

URBAN LAND USE

No potentially significant unavoidable impacts related to urban land use are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Displacement of some existing commercial uses and residents from Program actions located in urban land use areas.	1,2,5,6				
Physical disruption or division of established communities.	1-10				
Potential conflicts of habitat development and storage and conveyance facilities with general plan land use designation or zoning if located in urban use areas.	3,4				

Mitigation Strategies

1. Selecting and designing program actions that minimize the displacement of existing residents.
2. Selecting and designing Program actions that do not physically disrupt or divide established communities.
3. Selecting Program actions, to the extent practicable, that are consistent with local and regional land use plans.
4. Notifying all affected persons (for example, residents, property owners, school officials, and business owners) in the project area of the construction plans and schedules.
5. Providing relocation assistance to displaced persons or businesses.
6. Minimizing the amount of permanent easement required for construction of facilities and consulting with property owners to select easement locations that would lessen property disruption and fragmentation, if applicable.
7. Relocating roads and utilities prior to project construction to ensure continued access and utility service through the project area.

8. Preparing a detailed engineering and construction plan as part of the project design plans and specifications, and including procedures for rerouting and excavating, supporting, and filling areas around utility cables and pipes in this plan.
9. Verifying utility locations through consultation with appropriate entities and field surveys (such as probing and pot-holing).
10. Reconnecting disconnected cables and lines promptly.

UTILITIES AND PUBLIC SERVICES

No potentially significant unavoidable impacts related to utilities and public services are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Possible need for relocation or modification of major infrastructure components	1,2,4,5				
Increased risk of gas line rupture during construction phase	3, 5 (in findings)				

Mitigation Strategies

1. Siting project facilities and transmission infrastructure to avoid existing infrastructure.
2. Constructing overpasses, small bridges, or other structures to accommodate existing infrastructure.
3. Coordinating construction activities with utility providers.
4. Designing and operating facilities to minimize the amount of energy required and to maximize the amount of energy created.
5. Designing project facilities to avoid or minimize their effect on existing infrastructure.

RECREATION

Bold indicates a potentially significant unavoidable adverse impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Temporary closure of recreation areas during construction	1,2,3,6,7,8,9,10,15,16,17				
Increased speed zone restrictions or prohibition of motorized boating in some areas	1,2,3,6,8,9,17				
More stringent regulation of boat discharges	1,9,11				
Temporary or permanent changes in boating access and navigation	1,2,3,4,5,6,7,8,9,17				
Permanent closure of some recreation facilities	1,2,9, 11,15,17				
Increases in boat traffic in some areas because of speed and access restrictions	1,2,3,4,5,6,7,8,9,17				
Decrease in recreation opportunities because of speed and access restrictions	1,2,3,4,5,6,7,8,9,17				
Potential decrease in flooded lands suitable for wildlife, hunting, and fishing as a result of water use efficiency actions	1,9,10,11,14				
Potential for reduced water-contact recreation quality from releases of reservoir cold water	1,9,15,16,17				
Displacement of fish and wildlife from new off-stream or expanded on-stream reservoirs	9,14				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Potential loss of terrestrial and on-stream recreation from new off-stream or expanded on-stream reservoirs	1,9,14,15,17				
Potential for reduced access to recreation facilities and decreased recreation opportunities from changes in reservoir levels	1,9,10,11,12,13,17				
Potential short-term construction impacts of dredging, such as obstructing or closing channels and creating noise and visual impacts	7				

Mitigation Strategies

1. Incorporating project-level recreation improvements and enhancements.
2. Maintaining boating access to prime areas.
3. Identifying and marking alternate boating routes.
4. Constructing portage facilities.
5. Constructing boat locks.
6. Providing public information regarding alternate access.
7. Avoiding construction during peak-use seasons and times.
8. Posting warning signs and buoys in channels.
9. Working with recreational interests to protect and enhance recreation resources.
10. Providing in-kind recreation facilities.
11. Relocating or constructing new recreation facilities and infrastructure.
12. Maintaining reservoir levels as high as possible during the recreation season.

13. Minimizing water level fluctuation and establishing minimum pool levels.
14. Purchasing trail rights-of-way or recreational easements.
15. Providing or improving vehicle access and parking for recreation areas.
16. Providing access to waterfront areas and island edges.
17. Creating new day-use boating and camping areas.

FLOOD CONTROL

No potentially significant unavoidable impacts on flood control are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Impacts on levee stability from levee and berm vegetation management practices for habitat purposes.	1,2				
Reduced levee stability from habitat restoration using conservation easements along riparian corridors.	1,2,4				
Increased seepage on adjacent islands, possibly leading to flooding from seepage-induced failure from shallow flooding of Delta islands susceptible to subsidence.	5,6,7,8				
Increases in wind-fetch and wave erosion on landside levee slopes from island flooding.	9,10,11				
Increased levels of flooding downstream of diversions after removal of diversion structures and other obstructions to flow in the Sacramento River tributaries.	3				
Increased flood stages along streams due to increases in the roughness of the stream channel from vegetation on stream banks.	4				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Potential localized subsidence, resulting in levee slumping or cracking if occurring near levees, caused by potential increases in groundwater pumping.	13,14				
Increased stage upstream of and possibly decreased stage downstream from gate structures located in channels that reduce the channel's flood flow conveyance.	15				

Mitigation Strategies

1. Allowing reasonable clearing of deep-rooted trees and shrubs from levee side slopes to support inspection, maintenance, repair, and emergency response, while preserving some habitat values.
2. Permitting clearing of deep-rooted shrubs and trees on levee side slopes. Trees and shrubs should be allowed to grow only on adjacent berms. If roots penetrate levees, fill materials should be added to levee landside slopes in order to construct a partial setback levee and increase stability.
3. Widening streams downstream of removed water diversion structures to increase conveyance capacity.
4. Incorporating flood control criteria into the design of stream bank revegetation projects. For example, by increasing the width of vegetated sections to maintain conveyance capacity, the net effect of vegetation on flood control would be negligible.
5. Identifying location susceptible to seepage-induced failure on Delta islands that may be intentionally flooded for habitat.
6. Implementing a seepage monitoring program on nonflooded islands adjacent to potential shallow-flooded islands.
7. Developing seepage control performance standards to be used during island flooding and storage periods to determine net seepage caused by shallow flooding.
8. Improving levees to withstand expected hydraulic stresses and seepage
9. Designing erosion protection measures to minimize or eliminate wave splash and run-up erosion.
10. Using riprap or another suitable means of slope protection to dissipate wave force.

11. Constructing large wind/wave breaks in the flooded islands to reduce wind-fetch and erosion potential.
12. Identifying existing or planned wells that could affect groundwater and substrate conditions underlying nearby levees or flood control facilities.
13. Providing incentives to terminate use of wells that can adversely affect levee stability, reducing their pumping volume to safe withdrawal levels as they affect substrate stability, or otherwise replacing them with sources that could not affect levee stability.
14. Designing structures to minimize the loss of channel conveyance at gate structures located in channels.

CULTURAL RESOURCES

No potentially significant unavoidable impacts on cultural resources are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Impacts on cultural resources from ground-disturbing activities.	1-9,11				
Impacts on cultural resources from new construction, excavation, or fill.	1-9, 11				
Inundation of cultural resources from flooding	1-11				
Impacts on cultural resources from alteration of existing facilities.	1,7,10				
Impacts on cultural resources from construction of new facilities.	1-9,11				
Alteration of the historic setting of a cultural resource.	1-11				
Introduction of elements out of character with a cultural resource site.	1-11				

Mitigation Strategies

1. Conducting cultural resource inventories.
2. Avoiding sites through project redesign.
3. Mapping sites.

4. Conducting surface collections.
5. Performing test excavations.
6. Probing for potentially buried sites.
7. Preparing reports to document mitigation work.
8. Conducting full-scale excavations of sites slated for destruction as a result of projects.
9. Preparing public interpretive documents.
10. Documenting historic structures by preparing Historic American Engineering Records or Historic American Building Surveys.
11. Conducting ethnographic studies for traditional cultural properties.

PUBLIC HEALTH AND ENVIRONMENTAL HAZARDS

No potentially significant unavoidable impacts on flood control are associated with the Preferred Program Alternative.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Short- and long-term increases in mosquito breeding habitat from wetland restoration activities or fluctuating water levels.	1,2,3,4,5				
Increased risk of groundwater and surface water contamination from naturally occurring or spilled hazardous materials and from improper handling of hazardous materials.	6				
Increased exposure to hazardous materials and waste from construction activities related to storage and conveyance projects.	6,7,8,9,11, 12				

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Increases in water quality degradation, resuspension of contaminants, and exposure to hazardous materials from dredging activities.	6,8,9,11,12				
Increases in levels of methyl mercury released to the Bay-Delta ecosystem from wetland restoration and levee rehabilitation activities.	10				

Mitigation Strategies

1. Using various mosquito control methods, such as biological agents, chemical agents, and ecological manipulation of mosquito breeding habitat.
2. Supporting actions to establish or find funding for mosquito abatement activities.
3. Removing or disturbing water that remains stagnant for more than 3 days at a construction site.
4. Limiting construction to cool weather, when mosquito production is lowest.
5. Limiting construction to periods of low precipitation to avoid forming pools of standing water.
6. Following established and proper procedures and regulations for removing and disposing of contaminated materials.
7. Increasing monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.
8. Limiting or coordinating construction activities to favorable weather conditions to forestall dispersing hazardous materials.
9. Conducting core sampling and analysis of proposed dredge areas and engineering solutions to avoid or prevent environmental exposure of toxic substances after dredging.
10. Modifying engineering plans to minimize mercury-related problems.
11. Capping exposed toxic sediments with clean clay/silt and protective gravel.
12. Locating constructed shallow-water habitat away from sources of mercury until methods for reducing mercury in water and sediment are implemented.

VISUAL RESOURCES

Bold indicates a potentially significant unavoidable impact.

Potentially Significant Adverse Impacts	Mitigation Strategies	Applicable?	Discussed?	Mitigation Proposed	Notes
Introduction of new facilities or presence of constructed linear and obtrusive features (such as levees, dams and spillways), view obstructions, and a bathtub ring effect caused by fluctuating water levels from drawdown and replenishment of storage reservoirs.	1,5,6,7,9, 10,11,12, 13,14				
Impacts in visually sensitive areas from restoration actions, such as creating borrow pits for gravel replacement and installing fish screens in areas with high visual sensitivity.	7,9,14				
Degraded watershed views from such actions as altered timber harvesting practices.	3,8,13,14				
Creation of borrow pits or spoils material disposal sites associated with storage, conveyance, and levee projects.	8,9,10,11, 12,14				
Long-term visual impacts from construction activities extending more than five years.	2,3,4,5,8,9, 14				

Mitigation Strategies

1. Timing changes in flow regimes to minimize “bathtub ring” effects during times of peak recreation use.
2. Minimizing construction activities during the peak-use recreation season.
3. Watering areas where dust is generated, where feasible, particularly along unpaved haul routes and during earth-moving activities, to reduce visual impacts caused by dust.
4. Avoiding unnecessary ground disturbance outside the necessary construction area.
5. Locating and directing exterior lighting at facilities and during construction activities so that it is concealed to the extent practicable when viewed from local roads, nearby communities, and any recreation areas.

6. Siting proposed reservoir(s), if possible, to minimize required cut-and-fill and locating the reservoir on the flattest topographic section of the site to minimize its visibility.
 7. Constructing facilities such as pumping-generating plants with earth-tone building materials.
 8. Revegetating disturbed areas as soon as possible after construction.
 9. Locating visually obtrusive features, such as borrow pits and dredged material disposal sites, outside visually sensitive areas and observation sites.
 10. Selecting vegetation type, placement, and density to be compatible with patterns of existing vegetation where revegetation occurs in natural areas.
 11. Installing landscape screening, such as grouped plantings of trees and tall shrubs, to screen proposed facilities, such as pumping-generating plant, from nearby sensitive viewers such as motorists and residents.
 12. Using native trees, shrubs and groundcover for landscaping, when appropriate, at facilities such as dams and pumping-generating plants, and along new and expanded canals and conveyance channels, in a manner that does not compromise facility safety and access.
 13. Creating viewing opportunities of outstanding features (such as Mount Diablo and the Vaca Mountains) through selective vegetation reduction or constructing roadside viewing areas.
13. Recontouring and adding vegetation to areas rated as “poor” in variety class.



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